COVID-19 and Labor Market Outcomes for Colombian Women

An analysis of the impact of the pandemic on parents of young children.

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Abstract

The Coronavirus pandemic brought about a recession unlike any of its predecessors. With shuttered schools, travel bans, and stay-at-home orders across the globe, the economic effects of this virus have been broad and far-reaching. This thesis investigates the disparate economic effects of COVID-19 on men and women in Colombia by examining differences in labor market outcomes. We focus primarily on parents of younger children, utilizing a difference in difference model and Heckman correction to evaluate the effects of the pandemic on women's self-reported hours worked in the last week, labor force participation, and hourly wages relative to their male counterparts. Across genders, we observe reductions in wages, working hours and labor force participation during 2020 survey period. Further, we find that of parents who remained in the labor force, women experienced smaller reductions in working hours and wages; however, mothers were up to twice as likely to exit the labor force altogether. These findings have concerning implications for the effects of the pandemic on economic equality for women.

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Contents

1 Introduction

The Coronavirus pandemic, which was first documented in humans in Wuhan, China in late 2019 (World Health Organization, 2020), has brought about unprecedented public health challenges. Subsequent attempts by governments and other leadership to control the disease have included lockdowns, stay-at-home orders, school and business closures, among other measures. Though necessary, these public health initiatives have created a host of other economic and social challenges that have permeated every facet of society, the effects of which are glaringly apparent when looking at worldwide employment trends. For instance, as of June 2020, the International Labour Organization (ILO) reported that in the first quarter of 2020, over 5% of working hours were lost across the globe.

In addition to reductions in employment and working hours, the pandemic has also impacted time use patterns. In many locations, schools and day-cares have closed or moved online, and many jobs have transitioned to a virtual format. Without the capacity to outsource childcare, and with little ability to leave the house, many parents are now forced to dedicate significantly more time to childcare. This increased burden of household production may ultimately force some individuals out of the labor force altogether. Further, the impact of the pandemic was concentrated in female-dominated industries such as service and hospitality. These factors, in turn, could lead to widening gender gaps in labor force participation, reversing years of progress towards gender parity in the workplace. In the United States, for instance, the pandemic has resulted in 2.5 million women exiting the labor force, compared to 1.8 million men (Rogers, 2021), causing labor force participation rates for women to drop to their lowest level since 1987 (Djankov et al., 2021). Notably, the 2020 recession

is distinct from previous recessions, such as the one in 2008, where men experienced larger losses in employment and working hours (Landivar, 2020). This paper will seek to more fully understand the ways in which the pandemic and recession have impacted men and women differently by using changes in labor force participation, hourly wages, and weekly working hours to evaluate the pandemic's effect on labor market outcomes for women in Colombia.

Women, on average, already spend more time on household production and childcare duties and less time on work than their male counterparts. For Colombian women in particular, this gap in time spent on care-giving activities is of its largest magnitude for individuals in their 20s, when women spend almost ten more hours per week on childcare than their male counterparts (Tovar and Urdinola, 2019). In addition to unprecedented job losses, the pandemic has also led to large reductions in working hours, and a growing body of literature suggests that the economic hardships of the COVID-19 pandemic combined with stay-at-home measures will disproportionately impact women and exacerbate existing gender gaps. Because of school closures and work-from-home policies, the sheer quantity of hours spent on household production per household will likely increase, and studies suggest that the brunt of this burden will likely be borne by women (Alon et al., 2020). In fact, one study predicts that the gap between men and women's working hours could increase by as much as 50% in America (Collins et al. 2020).

While much existing research on the coronavirus-induced recession has focused on more developed economies such as the United States or the United Kingdom, this paper seeks to understand the manifestations of the pandemic in a less developed economic context. Due to differing gender norms and labor force participation rates

for women, it is important to investigate the effects of the pandemic in a range of countries. Colombia in particular is uniquely positioned, with a long history of violent conflict, and a successful but precarious peace agreement in place. In order to be able to create effective policy to mitigate the harmful impacts of COVID-19 on the labor market, it is important to first understand the way the pandemic impacted people in a range of political and economic contexts. We hope that this research will facilitate a better understanding of the pandemic's effects on inequalities in time use and labor market outcomes, particularly for women in less developed, post-conflict settings, so as to illuminate ways to target recovery policies in such a way that moves the needle closer to a gender equal world, rather than farther away.

This paper utilizes the Gran Enceusta Integrada de Hogares (GEIH), a monthly cross-sectional survey that collects labor market data from a representative sample of the Colombian population. We employ a difference in difference model that utilizes men as the control group and June 2020 as the "treatment" period. This allows us to discern the effects of the pandemic on labor force participation rates, self-reported hours worked in the last week, and hourly wages for women in Colombia, free from fixed, unobserved factors. Endogeneity issues arising from selection into the labor force due to the pandemic are accounted for using a Heckman correction.

Our results indicate that mothers of young children in Colombia were less likely to participate in the labor force prior to the pandemic, and were up to 6% more likely to exit the labor force during the pandemic relative to their male counterparts. Further, of those who remained in the labor force, mothers of young children were working more hours on average relative to the pre-pandemic period, though they still work fewer hours than their male counterparts overall. Further, we do not observe highly

significant changes in wages for mothers relative to fathers during the pandemic, though we do see a general reduction in wages during the 2020 period. However, preliminary efforts to correct for sample selection biases indicate that results for wages and working hours may be biased.

This paper will adhere to the following structure: we will first review a range of literature, before discussing a theoretical model for the paper. We then describe the data and how it is collected, explain the empirical model, and then discuss the results.

2 Background

Over the last twenty years, Latin America and the Caribbean has made the largest gains in female labor force participation of all regions of the world (Novta Wong, 2017). However, if left unmitigated, the effects of the pandemic have the potential to reverse these trends. In fact, the United Nations Economic Commission for Latin America and the Caribbean (2021) predicts that the pandemic-induced recession could reverse nearly ten years of progress in female labor force participation rates in the region. Colombia will likely be no exception to this pattern.

The first coronavirus case in Colombia was diagnosed in early March 2020. Eleven days later, a state of emergency was declared, after which the country went into quarantine on March 25th (Policy Responses to COVID19, 2020). The lockdown was officially lifted on the 1st of September, 2020, though a number of restrictions remain (Policy Responses to COVID19, 2020).

Compared to many of its neighbors, Colombia has had a fairly robust policy response to the pandemic. Preliminary data suggests that this may have been effective

in curbing some of the worst effects of the virus. Overall, Colombia experienced lower case and mortality rates than other countries in Latin America (De la Hoz-Restrepo et al., 2020). As of March 2021, Colombia has recorded over 2.6 million cases of the virus, resulting in 62,645 deaths since the start of the pandemic (World Health Organization, 2021). They have now administered over one million vaccine doses (World Health Organization, 2021). However, like nearly every other country, the labor market in Colombia was hit hard by the pandemic. In fact, 69% of male workers and 64% of female workers in the country were impacted, as they did not work in jobs that were either essential services or able to easily adjust to coronavirus restrictions (Cuesta Pico, 2020).

3 Review of Relevant Literature

Though the Coronavirus only became a widespread concern in the last year, there is already quite a bit of literature on its economic effects, and even on the gendered impacts of the recession. There also exists a large body of literature on the gender gap in working hours and labor market outcomes for women. In particular, there are a number of papers that investigate the gendered effects of previous recessions. However, most of the literature focuses on the United States or other more developed countries. In this section, we discuss some key papers on the aforementioned topics in order to provide the necessary background for this research.

3.1 Gendered Impacts of COVID-19

Alon et al. (2020), examine a number of different factors that may contribute to changes in the level of gender equality during and after the pandemic. They evaluate the ability to telecommute to work by industry, household structure, and division of childcare duties. The authors conclude that in America, women will be hit harder than men by the 2020 recession. They predict an additional 20 hours of childcare per week during the quarantine period due to school and daycare closures. Further, they anticipate that women will take on about 60% of that burden. Alon et al. also predict that the 2020 recession will cause more job losses for women, given their higher rates of employment in service and hospitality industries. This differs from previous recessions where men experienced more job loss. In their analysis of whether jobs in a given industry are "telecommutable," they find that 28% of male workers and 22% of female workers are employed in industries where at least 50% of respondents reported having the ability to telecommute.

Regarding COVID's effect on the gender gap in working hours specifically, Collins et al. (2020) use an individual level fixed-effects model to show the changes in weekly hours worked conditioning for the age of children and gender of parents. Ultimately, they find that in the US, the 2020 recession will likely increase the gender gap in working hours up to 50%.

In the United States, existing research shows that women experienced smaller increases in unemployment than their male counterparts during the pandemic, but were more likely to exit the labor force completely (Hershbein Holzer, 2021). Additional research on the effects of the pandemic in wealthier nations indicates that these gender gaps in employment are largely driven by those who are not able to telecommute or

work from home (Alon Et al., 2021). However, even for those who were able to work from home, many women ultimately shoulder the brunt of the burden of increased childcare (Alon Et al., 2021). This may be especially true for less educated women and those with young children, for whom childcare needs are greater – in fact, this childcare burden accounts for about 45% of the increase in the gender gap during the pandemic (Fabrizio et al., 2021).

Though existing research provides a useful background on how the pandemic has impacted gender equality in the labor force, the aforementioned studies largely focus on wealthy and highly developed nations. This paper, on the other hand, will utilize data from Colombia as a case study for middle-income Latin American nations.

3.2 Gendered Impacts of Previous Recessions

In determining the effects of the current recession on women's labor market outcomes, it may indeed be useful to understand the gendered impacts of previous recessions. Landivar (2020) found that, during the Great Recession of 2008, women experienced more stable rates of labor force participation; she also noted that, as a whole, labor force participation rates increased for mothers, though this varied by the characteristics of her husband. Landivar (2020) also found lower increases in rates of participation in the labor force if a mother's spouse was employed in a field that was impacted heavily by the recession.

In fact, the gender gap in employment actually decreased during the great recession in the United States and similar countries (Alon Et al., 2021). Based on data from previous economic downturns, this pattern seems to be the norm: male labor supply generally falls more than female supply (Alon Et al., 2021; Doepke and Terlit,

2016) Though men may have seen stronger adverse effects to their labor market outcomes from previous recessions, the nature of the 2020-2021 recession indicates that its effects will likely be markedly different. This paper will explore whether or not this is the case in developing economies with a history of violent conflict.

3.3 General Literature on Labor Market Gender Gaps

Gender gaps in the labor market are a well-documented phenomenon. Landivar (2015) looks at married couples aged 18 to 65, and calculates the gap between husband and wife's working hours as the dependent variable. They find that over half of the gap in employment hours is due to differences in work hours compared to unequal labor force participation. This means that it is worth evaluating changes in work hours in addition to changes in labor force participation, as both factors significantly impact disparities in working hours between men and women.

In Colombia specifically, research indicates that there are large gender gaps in time spent in the labor market versus time spent in household production. This gap is of its largest magnitude when women are in their late 20s. Compared to their male counterparts, Colombian women between 20 and 70 years of age devote, on average, triple the amount of their time to household production (Urdinola and Tovar 2018).

4 Theoretical Model

While the coronavirus pandemic certainly impacted the availability of jobs themselves, with nearly nine percent of working hours – or over 250 million jobs – lost in 2020 (ILO Monitor: COVID-19 and the World of Work. Seventh Edition, 2021), this

section will explore intra-household labor force participation decisions. We seek to explain why, in light of the extenuating circumstances brought on by the pandemic, certain individuals may choose to exit the labor force and how men and women will be effected differently. We predict that many individuals will be forced to exit the labor force in order to compensate for increased childcare and household production needs, which may help explain the gendered effects of the pandemic.

4.1 Constraints

This paper will utilize a unitary model of the household to examine time-use decisions within married couples. The unitary model enables us to treat the couple as a unit who works to jointly maximize utility for the household. We are interested only in heterosexual married couples, as we hope to discern the impact of the pandemic on utility maximizing for men and women in a couple. In particular, we expect those with younger children to experience more significant impacts. In accordance with Del Boca and Flinn (2014), we presume each spouse has the daily time constraint T, represented by the following function:

$$T_w = l_w + (\tau_w + \nu_w) + h_w. \tag{1}$$

$$T_m = l_m + (\tau_m + \nu_m) + h_m. \tag{2}$$

where l is time spent on leisure, τ is time spent on childcare and ν is time spent on other household production duties, such that $\tau + \nu$ is total time spent producing household goods. h represents time spent in the labor force (Del Boca and Flinn 2014). T_w is the time constraint for the wife, and T_m is for the husband. There are n

men and n women, represented by w and m subscripts, respectively. The daily time constraint for couple $[w, m]$ can then be written as

$$T_{wm} = T_w + T_m = l_w + (\tau_w + \nu_w) + h_w + l_m + (\tau_m + \nu_m) + h_m. \tag{3}$$

The total daily hours of childcare needs for a household are represented by τ_c, which includes the time the mother and father each spend on childcare in addition to the time the child spends in outsourced childcare arrangements such as a daycare, represented by τ_o. We assume that τ_c is fixed, as the child or children in a home require equal care hours regardless of provider.

$$\tau_c = \tau_w + \tau_m + \tau_o. \tag{4}$$

The household as a whole attempts to maximize utility, and its preferences are transitive, monotonic and convex.

A simple version of the household's utility function can be described as $U_{wm} = f(X_{wm}, Y_{wm}, L_{wm})$ where X_{wm} is household goods Y_{wm} is market goods, and L_{wm} is leisure time for the couple. X, Y, and L are subject to a time constraint, and X and Y are also subject to the budget constraint for the household, which can be represented by the following equation, based on Berlinski et al. (2020):

$$Y = h_w r_w + h_m r_m - \tau_o p + I_{wm}. \tag{5}$$

where p is the hourly rate of childcare and r is the hourly wage of each parent. Because the household is a rational utility maximizing entity, we assume r_w and r_m to be greater than p, so that payment for childcare services does not constitute a net

loss to the family. I represents the family's non-labor income.

The production of household goods is represented by $X_{wm} = f((\tau_{wm}+\nu_{wm}), Q_{wm})$. Recall that $\tau_{wm} + \nu_{wm}$ is the time spent by the couple producing household goods. Q_{wm} is a metric of the quality of the child or children in the home. This implies that the couple's utility is a function of time spent on childcare by the parents or outside providers, such that the couple is better off when their child is well cared for.

One spouse must have a comparative advantage in market production and the other must have a comparative advantage in household production. For simplicity, we assume that the partner with the comparative advantage in the labor market works full time and that childcare or schooling must be purchased in the event that both spouses are working in the labor force (Berlinski et al. 2020).

Because the pandemic and subsequent lockdown measures necessitated the closure of most in-person school and daycare operations, τ_o is believed to be zero during the lockdown period. For couples that did not select an outside childcare option prior to the pandemic, we assume that their utility maximizing arrangement will not change. For couples that utilized outside childcare providers, based on the predicted increase in childcare needs throughout the pandemic as described by Alon et al. (2020), the household's daily time spent on childcare and other household production duties, or $\tau_{wm} + \nu_{wm}$, will increase. Thus the couples combined leisure and labor market duties will decrease by a corresponding amount.

The adjusted budget constraint for the period after March of 2020 can be represented by

$$Y_{wm} = h'_w r_w + h'_m r_m + I_{wm} \tag{6}$$

We predict that the spouse that is comparatively advantaged in household pro-

duction will take on the majority of this burden, thus reducing their labor market and/or leisure hours. The implications of this shift are further discussed in the following section on optimal choices.

4.2 Optimal Choices

Recall the original budget constraint outlined in Equation 5, and the household utility function, which can once again be represented by $U_{wm} = f(X_{wm}, Y_{wm}, L_{wm})$. Prior to the pandemic, the couple's utility maximizing arrangement is $(X^*_{wm}, Y^*_{wm}, L^*_{wm})$, for which X, Y, and L are subject to the same constraints as outlined previously. The pandemic will not change the household's preferences; however, time use patterns, and thus the utility maximizing arrangement, will change.

If we assume $\tau_w + \tau_m$ increases by approximately 20 hours per week, as per Alon Et al. (2020), then the spouses must somehow compensate for their increased childcare needs. Families will thus see a commensurate reduction in working hours or leisure by at least one spouse, or the spouse that is comparatively less efficient in market production may exit the labor force entirely, depending on the family's childcare needs and unique preferences. Because τ_c is fixed, as a unit, the couple must now spend more time on childcare and less time on work and/or leisure. Couples will thus reduce their joint leisure and labor market time allocations to achieve the necessary level of household production, leaving them less well off.

The household will maximize its utility subject to the new budget constraint (See Equation 6) where they no longer pay for outsourced childcare, and the time constraints outlined above. Because the household receives utility from the quality of their children, the couple will have to reallocate their time such that they compensate

for the increased need for childcare given their fixed supply of time.

During the pandemic, based on the preferences of a given couple, the adjusted budget constraint and the adjusted values for household goods, market goods, and leisure, the couple will select a new utility maximizing arrangement $(X_{w_m^*}', Y_{w_m^*}', L_{w_m^*}')$ such that the marginal utility of consumption of household and market goods is equal to the marginal utility of leisure. In both periods, we can assume that the couples joint marginal utility for market goods is represented by $MU_{Ywm} = MU_{Yw} + MU_{Ym}$, their marginal utility for household goods is $MU_{Xwm} = MU_{Xw} + MU_{Xm}$, and their marginal utility for leisure is $MU_{Lwm} = MU_{Lw} + MU_{Lm}$.

Depending on the couple's preferences, they may have non-constant marginal utilities for a given input, such that their marginal utilities are functions of X, Y, and L, and thus may change at an increasing or decreasing rate. Given the new time allocations due to the pandemic, we know that time spent in household production must increase. The couples will thus adjust their optimal time allocations in an attempt to reach the highest level of utility possible given their constraints. The higher the joint marginal utility of each input, the better of the couples will be. If the couple can achieve higher levels of MU_{Ywm} and MU_{Xwm} by allocating their time such that one spouse specializes more heavily in market production and the other specializes more heavily in household production, then the couple will choose a utility maximizing bundle for which the spouses specialize based on earning potential and comparative advantages.

In many cases, this new optimal bundle may necessitate that one spouse who is comparatively advantaged in household production or who has less earning potential elects to leave the labor force or reduce their working hours. This occurs when the

indifference curve is tangent to the budget constraint at an arrangement in which one spouse now spends fewer hours in the production of market goods to compensate for the increase in production of household goods. When this occurs, $h'_w + h'_m < h_w + h_m$. If this is the case, then households will have less available income during the pandemic, such that $Y_{w_m}' < Y_{wm}$.

Due to a number of factors, including social norms related to care-giving, we predict that in many cases, the reduction in working hours or decision to exit the labor force will fall on the woman (Alon Et al., 2020). This follows the pattern shown in more developed countries, as described by Alon Et al. (2021), wherein the authors note that the increases in childcare needs during the pandemic have a larger negative impact on the labor supply of mothers than fathers.

It is important to note that COVID-related job losses and work-hour reductions are not limited to decisions to leave the labor market to devote more time to childcare or leisure; there will likely also be significant job loss and working hour reductions due to the recession caused by the pandemic.

5 Data

5.1 GEIH Data

This paper utilizes the Gran Encuesta Integrada de Hogares (GEIH), a monthly employment survey administered across a repeated cross-sectional sample of the Colombian population. Each household in the country has some probability of being selected in every administration of the survey, meaning that every survey collects data from a different sample of the Colombian population.

The survey collects information on general characteristics of the population, such as age, sex, marital status, the respondent's relationship to the head of the household, and whether the respondent is enrolled in school. It also collects information on employment, including basic information on employment status and average hours worked per week, and smaller details such as the method of transportation used to get to work. Furthermore, recent administrations of the survey contain information on the coronavirus, including questions about school closures and work hour reductions.

Since August of 2006, the GEIH has been administered every month, leading to a large quantity of available data (Roldán et al., 2013). We utilize data from surveys administered in June 2017, June 2018, June 2019, and June 2020 to account for differences before and after the virus, and general yearly trends in the absence of an exogenous shock. Household level data, including questions about internet access and transportation were not collected during the June 2020 administration of the survey.

Monthly data is separated into three categories: "Area," "Cabecera," and "Resto," based on the location from which the data was collected. These categories are each comprised of several sub-categories, divided by labor market status of the respondent, with several additional sections for demographic and household characteristics. Each of these categories was combined into a master data set for June 2017 through 2020.

The master data set contained a number of variables that were cleaned and utilized in the calculation of other key variables. The final sample, restricted to those 18-65 years old, in married or long-term couples who did not report working zero hours in the last week, is comprised of 67,110 respondents, though each of the three independent variables we utilize have a different number of respondents (See Table 1). Relevant variables already included in the data set include wages, education level,

sex, relationship to the head of the household, self-reported hours worked in the past week, access to a personal car, bicycle or motorcycle, and self-reported hours worked weekly on average. Adult respondents whose highest educational attainment level is preschool were excluded from the data due to insufficient observations.

The respondents are categorized by their employment within the dataset, and variables such as wages and working hours were only collected from those whose responses indicated that they were indeed employed at the time of data collection. Responses were not collected for those who were unemployed or out of the labor force. However, because of vacations, illness, errors in reporting, or other outside factors, a number of individuals who were classified as employed reported working zero hours in the previous week. The variable for self-reported hours worked in the last week is used as the dependent variable in a number of the regressions in this paper. To avoid biasing the data with extreme outliers, 3,210 individuals who reported working more than 80 hours in a week were dropped from the data, and those who reported working zero hours were excluded from the regressions, though the significance of these responses will be discussed in the following section.

Based on existing variables in the data set, we also calculated a variable for employment status. We did not include respondents under eighteen years of age or over 65 years of age in our employment status variable so as not to bias the results with retired persons or those not yet in the labor force. With this information, we created a binary variable to indicate whether an individual was in the labor force, denoting those who were unemployed, working part-time or working full-time as in the labor force. We utilized the GEIH categorization to identify labor-force non-participants. This labor force variable serves as one of our three primary independent variables.

The final independent variable, the natural log of hourly wages, was created using a number of other variables in the data set. First, we calculated a variable for weekly wages by dividing the monthly wage by 4.5. We then divided this by the existing self-reported average hours worked per week to get an approximation of hourly wages. This paper uses the natural log of that variable to analyze percentage changes in wages during the coronavirus pandemic.

Additionally, we created a variable to identify married or long-term couples. This was restricted to those who indicated that they were the head of the household or their spouse. Because we are primarily concerned with time-use decisions in married, heterosexual couples with children, we dropped same sex couples from the data set. In addition, we created a binary indicator for heads of households and their spouses, if applicable, that denotes whether they have children. We then created a variable for the age of the youngest child in the household for those households with children. We categorize children's ages into four sections: 1-5, 6-12, 12-17, and 18+ or no children (Collins et al., 2020). In the event that an individual has children in two or more age groups, we use the age of the youngest child. In keeping with Collins et al. (2020), we exclude families with children under one year old, since parents may be on maternity or paternity leave.

Because another family member living in the household, such as a grandparent or aunt, could impact the burden of childcare on the parents, or alternatively, require some form of care themselves, thereby increasing the burden on parents, we created a binary variable for whether the household had another adult family member who was neither the head of the household or their spouse. We elected to restrict this variable to other family members over forty, as younger family members may themselves be

working, and forty years of age was just below the mean age of other family members living in the households that responded to the survey.

5.2 Summary Statistics

Table 1 shows summary statistics for the three independent variables used in the regressions in Section 6: self-reported hours worked in the last week, labor force participation, and the natural log of hourly wages. These three variables only include respondents 18-65 years old who did not report working zero hours in the last week. The hourly wage variable had fewer responses than the hours worked variable in each year, resulting in a smaller sample size for these regressions. This table also includes summary statistics for other key variables, including the age of the respondent, whether the respondent has children, and all of the key controls in the model outlined in the following section. See Appendix for summary tables of key variables by the year of the survey.

Tables 12 through 15 show the cleaned but unrestricted samples for each year, 2017-2020. All four of these tables show comparable samples. Thus, we do not see evidence of selection issues as a result of the pandemic that might bias the 2020 sample.

5.3 2020 GEIH Data on COVID-19

June 2020 respondents were asked a number of questions about COVID-19-related hardships they have faced, including whether they lost their job due to COVID, contracted the virus, were furloughed, or had in-person classes cancelled. Table 2 reports the proportion of June 2020 respondents who answered yes to each of these

Table 1: Summary Statistics of Key Variables

	(1)				
	Count	Mean	Standard Deviation	Min	Max
Hours Worked Last Week	44676	42.430	14.875	1	80
In Labor Force	67114	.745	.436	0	1
Hourly Wage (ln)	19060	8.503	.691	4.017	12.215
Age	67114	42.936	12.067	18	65
Woman	67114	.518	.500	0	1
Working	66106	.670	.470	0	1
Other Relative 40+	67114	.137	.343	0	1
Has Kids	67114	.589	.492	0	1
No Kids/Infant	67114	.463	.499	0	1
Kids 1-5	67114	.223	.416	0	1
Kids 6-12	67114	.208	.406	0	1
Kids 13-17	67114	.107	.309	0	1
No Education	67110	.027	.163	0	1
Preschool	67110	.000	.008	0	1
1st-5th Grade	67110	.230	.421	0	1
6th-9th Grade	67110	.136	.343	0	1
High School	67110	.322	.467	0	1
Secondary Education	67110	.284	.451	0	1
N	67114				

Notes: The above table displays summary statistics for the restricted sample utilized in regressions. Variables are restricted to adults aged 18-65 in a married or long-term couple who did not report working zero hours in the last week.

questions by their sex for both the restricted and unrestricted samples.

Based on these tables, we see that in both the restricted and unrestricted sample, men experienced higher rates of reductions in economic activity and income and having employment suspended without pay, though the difference in the latter question was quite small in the restricted sample. They also failed to pay bills and/or debts and lost their job or income source at slightly higher rates. Overall, a higher

proportion of women indicated that they have not faced difficulties in both samples. Notable, in the restricted sample, over half of men and women experienced reduced economic activity and income.

As previously mentioned, this paper and the above tables exclude those who were classified as employed but reported working zero hours in the last week. Typically, those who report being employed but working zero hours in the last week do so because of illness, vacations, or discrepancies in reporting. In 2017, 2018, and 2019, between 3.41 and 4.41% of non-missing values for hours worked in the last week were 0s. During June of 2020, however, nearly 11% of those who responded to the question about how many hours they worked in the last week said that they worked zero hours. Due to the nature of the pandemic during the 2020 survey administration, we assume that the percentage of respondents on vacations during this survey period is negligible, which makes this discrepancy all the more striking. In fact, of the respondents who reported working fewer hours than usual, 95.57% attributed their reduction in work hours to the pandemic.

The gender breakdown of those who reported being employed but working zero hours is shown in Table 3. Interestingly, in 2020, the proportion of women reporting both being employed and working zero hours in the last week was around ten percentage points lower than in the three previous years. However, the raw number of women reporting working zero hours did increase by quite a bit during the pandemic.

Table 2: COVID-19 Hardship Questions: Restricted Sample

	(1) Unrestricted mean	(2) Restricted mean
Men		
Have or had COVID	.001	.015
Difficulty obtaining food or cleaning products	.139	.266
Failed to pay bills and/or debts	.164	.403
Reduced economic activity and income	.224	.560
Could not find job or start business	.093	.181
Employment suspended without pay	.017	.114
Lost job or source of income	.102	.141
Suspension of in-person classes	.154	.015
Felt alone, stressed, preoccupied, or depressed	.159	.311
Other	.031	.034
Have not faced difficulties	.219	.072
Women		
Have or had COVID	.001	.004
Difficulty obtaining food or cleaning products	.167	.266
Failed to pay bills and/or debts	.155	.375
Reduced economic activity and income	.137	.501
Could not find job or start business	.090	.152
Employment suspended without pay	.014	.105
Lost job or source of income	.097	.120
Suspension of in-person classes	.142	.014
Felt alone, stressed, preoccupied, or depressed	.196	.318
Other	.038	.051
Have not faced difficulties	.261	.136
Total		
Have or had COVID	.001	.010
Difficulty obtaining food or cleaning products	.154	.266
Failed to pay bills and/or debts	.159	.391
Reduced economic activity and income	.178	.535
Could not find job or start business	.092	.169
Employment suspended without pay	.015	.110
Lost job or source of income	.100	.132
Suspension of in-person classes	.147	.015
Felt alone, stressed, preoccupied, or depressed	.179	.314
Other	.035	.041
Have not faced difficulties	.241	.099
Observations	1161	1161

Notes: Proportion of respondents who answered yes to questions regarding hardships faced during COVID-19. Column one shows the entire 2020 sample, while column two is the sample restricted to adults aged 18-65 in a married or long-term couple who did not report working zero hours in the last week.

Table 3: Reported Working Zero Hours in Last Week

	(1)	
	Number of Zeros	Proportion Women
2017	1263	.595
2018	959	.582
2019	973	.579
2020	2410	.485
Total	5605	.543

Notes: Number of respondents who reported being employed but working zero hours in the last week and proportion of those respondent that are women.

6 Empirical Model

We estimate a number of ordinary least squares (OLS) regressions, some of which utilize a difference in difference estimator. We use this model to isolate the effect of COVID on women's labor force participation decisions in heterosexual married couples, both with and without children. We also utilize a Heckman Selection Correction to evaluate the presence of issues arising from selection into the work force. There are three primary independent variables on which we run the following model(s): a variable for self-reported hours worked in the last week for those classified as employed, a binary variable for labor force participation, and the natural log of hourly wages.

In accordance with our theoretical framework, we condition all of the following models on those who are in married, heterosexual couples and eighteen years of age or older. Additionally, all of the regressions with self-reported weekly hours worked and hourly wages are conditioned on the respondent participating in the labor force and thus working more than zero hours per week.

6.1 Ordinary Least Squares Regressions by Year

To estimate the effects of COVID-19 on labor market outcomes for women, we start by using the following model:

$$Y_{it} = \beta_0 + \beta_1 G_i + \beta_2 W_i + \epsilon_{it}. \tag{7}$$

where Y is one of three dependent variables: self-reported hours worked in the last week, hourly wages, or labor force participation. The primary independent variable, G, is binary indicator for the female respondents, taking on a value of zero for men and one for women. W is a vector representing a number of demographic control variables, including level of education, the presence of another family member over 40 years of age in the household, and the age of the household's youngest child. ϵ_{it} is the error term, assumed to be uncorrelated with W and G.

We estimate this model in four time periods: January 2019, June 2019, January 2020 and June 2020. These months were selected in order to provide constant intervals between cross-sections and include one set of observations at the height of the pandemic - in June 2020. This will provide preliminary information on what portion of changes in work hours are due to typical yearly trends, as shown in 2017-2019, and what portion are caused by the 2020 recession.

6.2 Difference in Difference Approach with Heterogeneous Effects

This paper is primarily concerned with elucidating gendered effects of the pandemic. To do this, we must differentiate between those effects that are felt by men

and women alike and which differ by gender. Further, we must account for changes in wages, working hours, and labor force participation that are due to trends over time or other shocks during 2020 that are unrelated to the pandemic. For this reason, we elect to use a difference in difference model, controlling for yearly trends. This model allows us to observe the effects of the pandemic that are specific to women by treating men as the control group, and the 2020 observations as those occurring during the treatment period (i.e. the pandemic). This allows us to observe what effects are specific to women during the pandemic by comparing them to men, who serve to account for any changes between 2019 and 2020.

In accordance with a standard difference in difference framework, June 2020 is the post-treatment period, with male respondents acting as the control group, and female respondents as those who receive treatment. The first difference is the difference between the outcome variable, either labor force participation, hourly wages, or working hours for women before and during the pandemic. The second difference shows the difference before and during the pandemic for the "control group" of men. This allows us to differentiate the disparate impacts of COVID on women relative to men by employing an interaction term for women during the pandemic.

It is necessary, in this case, to have some sort of control group against which we can compare women in June of 2020 in order isolate the gendered effects of the pandemic. While, based on existing reports and statistics, we can assume that many people lost jobs, reduced their working hours, or exited the labor force altogether, with this structure of a treatment and a control group, we can discern whether these losses more heavily affected women relative to their male counterparts and ensure that any other exogenous shocks during the treatment period are controlled for.

We estimate the following model, where we utilize an interaction term that is the result of a binary variable for woman and a binary variable for June 2020:

$$Y_{it} = \beta_0 + \beta_1 G_i + \beta_2 J_t + \Delta J_t * G_i + \alpha_1 T_t + \alpha_2 T_t * G_i + \beta_3 W_i + \epsilon_{it}. \tag{8}$$

Here, G represents the same binary variable for women as above, J_t is a binary variable indicating whether the respondent is from the June 2020 survey, which takes on a value of one for June 2020 and 0 for 2017-2019. ϵ_{it} represents un-observables. Following Hoxby's model of the effects of school unionization on the log of teacher salaries (1996), we attempt to discern the effect of existing time trends in working hours on the data in order to ensure robustness of the results. αT_t shows the overall time trend. This allows us to differentiate what changes in working hours are due specifically to the coronavirus, and what can be attributed to existing trends in working hours. We utilize data from June 2017, June 2018, and June 2019 to account for these trends. The $\alpha_2 T_t * G_i$ term is included in some of the regressions as a robustness check to account for time trends specific to women. This enables us to ensure we are identifying the effects of the pandemic on women, rather than merely observing a continuation of existing trends. $\beta_3 W_i$ is again a vector representing controls. The key indicator with which we are concerned is the interaction term, $\Delta J_t * G_i$. We interpret Δ to represent the effect of being a woman during the pandemic.

We estimate this model a number of times, using differing dependent variables to discern whether women are more prone to reducing their working hours, losing their jobs, or exiting the labor force altogether. Based on the theoretical model outlined in Section 3, we presume that couples with different childcare needs may adapt differently to the unique demands of the pandemic. As such, we attempt to

discern the heterogeneous effects of these needs by conditioning on the age of the youngest child. This variable, as outlined in Section 4, breaks down children's ages into three groups, excluding infants. As such, each regression is run four times to include each age group and couples without children.

6.3 Heckman Selection Correction

Two of the three independent variables, hourly wages and hours worked in the last week, are observed only for those who are employed. Those who are not classified as employed have missing values for both variables. Therefore, the missing variables in our sample are not random; rather, all those included in the sample for these two independent variables are in the labor force and employed. Those who would receive low wages or work an unsatisfactory number of hours likely select out of the labor force. As a result, the results of the previous model may be misleading due to sample selection bias.

A Heckman correction, as proposed by Heckman (1976, 1979), is often used to correct for bias arising from the non-randomness of a sample. The selection correction is run in two stages. The first stage, known as the selection equation, utilizes a probit model, where the outcome variable represents whether or not the independent variable in the main stage is observed. This occurs when $Z_i > 0$.

The two-step Heckman correction (Heckman, 1979) is outlined below:

$$I : Z_i = \alpha_0 + \alpha_1 G_i + \alpha_3 W_i + \alpha_4 R_i + \epsilon_{1i}. \tag{9}$$

$$II : Y_i = \beta_0 + \beta_1 G_i + \beta_3 W_i + \delta \lambda_i + \epsilon_{2i}. \tag{10}$$

The first stage of the correction utilizes a probit model for which Z_i can take on a value between zero and one. Any value of $Z_i > 0$ indicates that the respondent is working, and thus there should be a non-missing observation for Y_i. In order to improve the accuracy of the estimates and mitigate concerns of collinearity between models (Vella, 1998), we introduce an exclusion restriction, R_{it}. R_{it} is assumed to impact one's likelihood of working but not wages or hours worked.

In this model, the restriction utilized is a composite variable for transportation, which takes on a value of one when the respondent's household has access to a car, motorcycle or bicycle. We propose that access to transportation will impact hours worked and wages only through it's relation with one's likelihood of working. Limitations of this restriction will be discussed further in Section 8. However, household level data, including data on transportation access, was not collected during June of 2020, as a result of the pandemic. As such, we are unable to run this selection correction on the full sample. Instead, we evaluate the selection correction on each of the three years prior to the pandemic, and are thus able to make inferences about the impact of the Heckman correction on our complete sample.

We introduce a separate exclusion restriction for wages that is available over the entire four-year sample. For this restriction, we utilize the binary variable for a whether or not there is a resident in the household who is at least forty years of age and is not the head of household or their spouse. We also include the variables for the year 2020, being a woman, and their interaction, along with overall time trends and time trends for women in this version of the model. Another relative over 40 in

the household is presumed to impact one's likelihood of working, as another adult in the house, such as a grandparent, might help relieve some of the childcare burden on a couple; however, it would likely only have an impact on wages through its effect on likelihood of working.

Equation 10 is an ordinary least squares regression that includes the same variables as Equation 9 with the exception of the exclusion restriction. λ_i is known as the Inverse Mills Ratio, and it has the following attributes (Heckman, 1976):

1. the denominator of λ_i represents the likelihood that individual i has a non-missing value for the dependent variable in the second stage.

2. Therefore, the larger the likelihood that individual i has a non-missing value for the dependent variable in the second stage, the smaller the value of λ_i.

A hypothesis test that δ, the coefficient of $\lambda_i = 0$ serves as a test of sample selectivity, where $\delta = \rho_i * \sigma$. We assume that both ϵ_{1i} and ϵ_{2i} are normally distributed and $corr(\epsilon_{1i}, \epsilon_{2i}) = \rho_i$. The standard deviation of ϵ_{1i} is represented by σ.

7 Results

7.1 Pre Trends

This section will discuss the use of time trends in the subsequent iterations of the model. Estimating the direction and significance of trends in labor force participation, weekly working hours, and hourly wages enables us to discern what effects are due to existing time trends and what can be attributed to the exogenous shock of the pandemic. Including an interaction between time trends and women allows us to

better ensure we are identifying the effects of the pandemic on women specifically, by ensuring we control for the trends observed prior to the pandemic.

All three regressions include a variable for year and an interaction for woman and year. The year 2020 is excluded from the regression, since we are only concerned with pre-trends in this section. Table 4 shows significant yearly pre-trends.

Table 4: Key Outcome Variables with Time Trends

	(1)	(2)	(3)
	Labor Force Participation	Weekly Working Hours	Hourly Wages
Year Trends	0.0685***	1.880***	0.0883***
	(0.00228)	(0.0939)	(0.00579)
Woman Year Trends	-0.148***	-4.395***	-0.0814***
	(0.00161)	(0.0706)	(0.00432)
Controls	Yes	Yes	Yes
Constant	0.710***	40.14***	7.743***
	(0.0109)	(0.474)	(0.0436)
Observations	49956	35456	14829

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Key controls are included in the regression but not reported in the table.

Overall yearly trends and those for women are adjusted such that 2017 = 1, 2018 = 2, 2019 = 3, and 2020 = 4.

Based on information included in Table 4, we find that for all three of the key outcome variables, women experienced negative time trends relative to their male counterparts.

Ultimately, however, we find that when included in the subsequent regressions, we rarely see a significant effect when controlling for other variables, particularly for

trends for women. As such, we elect to include only overall yearly trends without reporting coefficients and include time trends for women in certain regressions as a robustness check.

7.2 Difference in Difference Approach with Heterogeneous Effects

Table 5 reports the results of the difference in difference regressions[1], accounting for the heterogeneous effects of the age of a respondent's youngest child. In accordance with the theoretical model outlined in Section 3 that predicts larger impacts for families with greater childcare needs, this table only includes results for respondents whose youngest child is between the ages of one and twelve years old. See Appendix B Table 16 for results for married adults with older children or no children. To further validate these results, we include yearly trends in each of these models. This ensures that the effects we observe during the pandemic are not just due to employment trends over time.

In the pre-covid period, mothers of young children, on average, work between ten and eleven fewer hours per week, are as much as 35% less likely to participate in the labor force, and earn around 20% lower hourly wages than their husbands. The results align with well-documented labor market gender gaps in Colombia and worldwide. We observe the same patterns for parents of older children and couples without children.

We interpret "Covid" as the effect for respondents in June of 2020, showing the effects felt by the control group during the treatment period. Based on these findings,

[1]Results for parents of older children and couples with no children can be found in Appendix B

between 2019 and 2020, Colombians experienced a statistically significant decrease in working hours, wages and probability of being in the labor force. Some of these effects may be due to the exogenous shock of the pandemic on the economy. However, this also aligns with the predicted effects of the pandemic outlined in Section 3, wherein the increase in a couple's time spent on childcare and household production duties, $\tau_{wm}+\nu_{wm}$, caused by the pandemic might force certain spouses to reduce their working hours or leave the labor force altogether.

The primary independent variable of interest, an interaction between the binary variable for 2020 respondents and the binary variable for women, is the difference in difference effect for female respondents during the pandemic. As reported in Table 5, women who were in the labor force saw smaller decreases in their weekly hours worked relative to men, though mothers, on average, worked fewer hours than fathers to begin with. Specifically, before the pandemic, women worked an average of about 38 hours per week, while men worked about 46 hours per week on average. These results show that fathers of young children experienced a nearly nine hour reduction in their weekly working hours during June of 2020, on average, while the pandemic led mothers of young children to only reduced their working hours by about four hours per week. In other words, during the pandemic, mother of the youngest children reduced their hours by about five hours fewer, when compared to the control group of men.

Similarly, the wages of married mothers of young children who worked decreased less than their male counterparts, staying at about the same levels, while overall wages decreased by a margin of about 10% between the 2019 and 2020 periods. However, the change in wages was less significant than that of working hours.

Rather than indicating that women actually did not experience as drastic reductions in working hours and wages relative to their husbands, the coefficients on working hours and wages may actually indicate that the women who did stay in the labor force were those who worked more hours and made more money to begin with, while others selected out of the labor force during the pandemic. We attempt to better understand this ambiguity by employing a selection correction in the following sections.

The data from the same regressions restricted to parents of children aged 13-17 or couples without children (See Appendix Table 16) also show that women in June of 2020 saw a positive and statistically significant effect on their working hours as a result of the pandemic, though of a slightly smaller magnitude than mothers of younger children. In particular, married men without kids experienced a decrease in working hours of about six hours per week during 2020, while the pandemic caused married women without kids to only saw a decrease of about two hours per week. However, we see that women without kids are more than 35% less likely than their husbands to participate in the labor force – a disparity nearly of the same magnitude as that for couples with kids aged one to five.

For the parents with older children or couples with no children, the coefficient on wages was once again positive, but only significant for those without kids. However, while there was an overall drop in labor force participation rates during the pandemic, these women did not experience a significant change in their likelihood of participating in the labor force relative to their male counterparts. This is likely because the increase in $\tau_{wm} + \nu_{wm}$ was not as drastic for those families who only have older children or no children at all. As such, we still see some effects on working hours,

perhaps due to the exogenous economic conditions, but we observe no real gender differences in changes in labor force participation decisions, since the increase in household production needs was not significant enough to warrant leaving the labor force altogether.

As shown by these results, mothers of young children were less likely to participate in the labor force during the COVID-19 pandemic, whether through employment or through the job search, than both their male counterparts in the same time period and other women in previous years. While fathers of the youngest children were 3.5% less likely to participate in the labor force during June 2020 relative to previous years, wives were almost twice as likely to be nonparticipants relative to their husbands as a result of the pandemic. We observe the same pattern for parents of children aged six to twelve, where husbands are 6.7% less likely to be in the labor force relative to the pre-pandemic period, and wives are some 12.5% less likely to be in the labor force during the pandemic. In accordance with the theoretical model outlined in Section 3, this provides evidence that the effects of the increase in τ_{couple} were mostly borne by women who had to exit the labor force to perform household production duties.

Thus, of the mothers and fathers who did remain in the labor force, mothers were less likely to see a negative effect on their hourly wages or reduce their working hours – whether by choice or at their employer's discretion. However, mothers were more likely to leave the labor force altogether due to the effects of the pandemic. These results lend themselves to the conclusion that in two-parent households with young children, women are being pushed out of the labor force in order to compensate for the increased childcare needs caused by school and daycare closures.

Table 5: Difference in Difference

	(1)Weekly Work Hrs 1-5 Years	(2)Weekly Work Hrs 6-12 Years	(3) LFP 1-5 Years	(4)LFP 6-12 Years	(5)Wages 1-5 Years	(6)Wages 6-12 Years
Covid	-8.919***	-8.487***	-0.0355**	-0.0670***	-0.0901**	-0.115***
	(0.541)	(0.584)	(0.0128)	(0.0132)	(0.0312)	(0.0331)
Covid x Woman	4.829***	4.740***	-0.0343*	-0.0580***	0.102*	0.101*
	(0.699)	(0.729)	(0.0137)	(0.0141)	(0.0405)	(0.0413)
Woman	-11.05***	-10.42***	-0.363***	-0.285***	-0.176***	-0.229***
	(0.314)	(0.321)	(0.00687)	(0.00701)	(0.0190)	(0.0187)
Other Relative 40+	-1.035**	0.207	0.0310***	0.00304	-0.0604**	0.0147
	(0.383)	(0.444)	(0.00866)	(0.00971)	(0.0229)	(0.0249)
First - Fifth	-0.344	1.740	-0.0248	0.0315	0.211*	0.0676
	(0.997)	(1.087)	(0.0232)	(0.0237)	(0.0998)	(0.0896)
Sixth - Ninth	-0.0760	2.050	-0.0257	0.0536*	0.302**	0.137
	(1.013)	(1.113)	(0.0234)	(0.0242)	(0.100)	(0.0908)
High School	1.724	3.139**	0.00968	0.0625**	0.487***	0.291***
	(0.966)	(1.068)	(0.0225)	(0.0233)	(0.0977)	(0.0879)
Secondary Ed.	1.512	3.052**	0.110***	0.162***	1.056***	0.946***
	(0.967)	(1.070)	(0.0226)	(0.0233)	(0.0977)	(0.0878)
Year Trends	Yes	Yes	Yes***	Yes	Yes***	Yes ***
Constant	-622.0	-498.9	31.85***	1.881	-80.18***	-107.0***
	(369.8)	(384.1)	(8.465)	(8.614)	(21.82)	(22.06)
Observations	10363	10132	14941	13933	4827	4499

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

7.2.1 Time Trends for Women

As a robustness check, we re-run the above regressions including an interaction term for woman with the categorical variable for year. In doing so, we attempt to mitigate concerns about differential time trends for men and women that could bias the results. Table 15 shows the results of these regressions. In most cases, including time trends for women slightly changes the parameter estimates in these regressions, but does not impact the overall effects discussed above or the statistical significance of the coefficients reported in the tables. However, there are a few notable differences:

When accounting for overall time trends and those time trends that are specific to women, we no longer see statistically significant effects of being a woman during the 2020 pandemic on hourly wages for the two youngest age group and for couples without kids (see Appendix B Table 17). Even without time trends for women, this coefficient was not statistically significant for mothers of kids aged 13-17. This indicates that, when accounting for existing trends in wages for women, married women largely did not experience shock to their wages relative to their husbands during the pandemic.

Perhaps most notably, when controlling for trends in labor force participation for women over time, we see that the coefficient on the interaction term that represents the impact of the pandemic on mothers of the youngest children is no longer significant. This is due to pre-existing negative trends for labor force participation for mothers of young children. However, we do still see that, controlling for other factors, mothers of children aged 6-12 were nearly twice as likely as their male counterparts to be out of the labor force during the pandemic. This pattern aligns with the findings of Collins et al. (2020), who note that the larger effect of the pandemic on mothers

of this age group likely stems from the fact that children of this age group are likely to be in elementary or middle school, and thus require more hands-on and intensive assistance from their parents than children of other age groups.

Table 6: Difference in Difference

	(1)Weekly Work Hrs 1-5 Years	(2)Weekly Work Hrs 6-12 Years	(3) LFP 1-5 Years	(4)LFP 6-12 Years	(5)Wages 1-5 Years	(6)Wages 6-12 Years
Covid	-8.577***	-7.894***	-0.0624***	-0.0680***	-0.0878*	-0.107**
	(0.606)	(0.662)	(0.0154)	(0.0157)	(0.0347)	(0.0376)
Covid x Woman	3.852***	3.259**	0.0194	-0.0560*	0.0954	0.0815
	(1.045)	(1.068)	(0.0217)	(0.0222)	(0.0603)	(0.0599)
Woman	-12.00***	-11.88***	-0.309***	-0.283***	-0.183***	-0.249***
	(0.816)	(0.834)	(0.0181)	(0.0184)	(0.0501)	(0.0490)
Other Relative 40+	-1.034**	0.199	0.0310***	0.00304	-0.0604**	0.0146
	(0.383)	(0.444)	(0.00866)	(0.00971)	(0.0229)	(0.0249)
First - Fifth	-0.341	1.751	-0.0250	0.0315	0.211*	0.0672
	(0.997)	(1.087)	(0.0232)	(0.0237)	(0.0998)	(0.0896)
Sixth - Ninth	-0.0763	2.072	-0.0257	0.0536*	0.302**	0.136
	(1.013)	(1.113)	(0.0234)	(0.0242)	(0.100)	(0.0909)
High School	1.722	3.152**	0.00957	0.0625**	0.487***	0.291***
	(0.966)	(1.067)	(0.0225)	(0.0233)	(0.0977)	(0.0879)
Secondary Ed.	1.509	3.054**	0.110***	0.162***	1.056***	0.946***
	(0.967)	(1.070)	(0.0225)	(0.0233)	(0.0977)	(0.0878)
Year Trends	Yes	Yes	Yes	Yes	Yes**	Yes***
Woman Year Trends	Yes	Yes	Yes**	Yes	Yes	0.00983
Constant	47.27***	45.61***	0.956***	0.892***	7.744***	7.945***
	(1.048)	(1.148)	(0.0251)	(0.0258)	(0.100)	(0.0919)
Observations	10363	10132	14941	13933	4827	4499

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

Overall yearly trends and those for women are adjusted such that 2017 = 1, 2018 = 2, 2019 = 3, and 2020 = 4.

7.3 Ordinary Least Squares Regressions by Year with Heterogeneous Effects

This section includes a table of four regressions for the two outcome variables that are recorded only for those who are employed: self-reported hours worked in the last week and the natural log of hourly wages. Because there is no household level data available for 2020, we instead correct for sample selection bias on individual yearly regressions for the data from 2017-2019. We use the regressions in this section as points of comparison from which we can infer the impacts of a selection correction on the full data set. Each regression is run on data from June of the specified year and restricted to individuals in married or long-term couples who are above the age of 18. These regressions show yearly differences in the key controls and variables of interest.

Table 6 shows how key factors impacting self-reported weekly working hours. As shown in the table, across all four years included in the sample, married adult women report working fewer hours per week than their male counterparts. Though the binary variable for women is highly significant in every year, it is important to note that the difference between weekly working hours for men and women decreases with each year. The significance of each of our control variables varies from year to year, though the constants in each regression show that overall, respondents are working fewer hours in 2020. Appendix B Table 18 shows the results of these yearly regressions for parents of older kids and couples without kids. We observe the same patterns across all groups.

Table 7 displays the results of the same regression with the log of hourly wages as the dependent variable. As shown, married, adult women with young kids on average earn between 14 and 27 percentage points less than their male counterparts, though

for parents of the youngest age group, this discrepancy was lowest in 2020. This specific pattern is also true for couples without kids, as shown in Appendix B Table 19, and overall, parents of older children and couples without children observe similar negative and significant coefficients for women, though often of a larger magnitude. In these tables, we see the effects of education on labor market outcomes through the statistically significant, positive effect of secondary education on wages in all four of the regressions.

Table 7: Self-Reported Weekly Work Hours by Year

	(1) 2017: 1-5 Years	(2) 2017: 6-12 Years	(3) 2018: 1-5 Years	(4) 2018: 6-12 Years	(5) 2019: 1-5 Years	(6) 2019: 6-12 Years	(7) 2020: 1-5 Years	(8) 2020: 6-12 Years
Woman	-11.26***	-11.25***	-11.17***	-10.02***	-10.26***	-9.869***	-6.979***	-6.008***
	(0.536)	(0.545)	(0.512)	(0.531)	(0.549)	(0.554)	(0.697)	(0.731)
Other Relative 40+	-0.298	0.450	-0.986	-1.383	-0.719	1.462	-2.223*	0.258
	(0.747)	(0.898)	(0.720)	(0.836)	(0.709)	(0.843)	(0.922)	(0.999)
First - Fifth	0.258	0.956	-0.406	1.571	-0.00425	2.132	-1.704	3.005
	(1.740)	(1.887)	(1.966)	(2.062)	(1.887)	(2.198)	(2.597)	(2.750)
Sixth - Ninth	1.381	3.164	0.0854	1.086	-1.443	3.065	-0.417	-0.0815
	(1.792)	(1.937)	(1.997)	(2.108)	(1.905)	(2.238)	(2.613)	(2.837)
High School	1.288	3.030	2.276	3.302	1.532	4.084	1.937	2.228
	(1.698)	(1.864)	(1.920)	(2.029)	(1.808)	(2.152)	(2.503)	(2.684)
Secondary Ed.	0.939	2.110	1.188	1.976	0.0549	3.828	4.424	4.829
	(1.700)	(1.871)	(1.924)	(2.031)	(1.811)	(2.155)	(2.501)	(2.693)
Constant	47.17***	45.85***	47.73***	46.22***	48.20***	44.60***	38.76***	37.44***
	(1.650)	(1.809)	(1.880)	(1.988)	(1.770)	(2.111)	(2.452)	(2.618)
Observations	2799	2783	2775	2693	2641	2664	2148	1992

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

Table 8: Ln Hourly Wage by Year

	(1) 2017: 1-5 Years	(2) 2017: 6-12 Years	(3) 2018: 1-5 Years	(4) 2018: 6-12 Years	(5) 2019: 1-5 Years	(6) 2019: 6-12 Years	(7) 2020: 1-5 Years	(8) 2020: 6-12 Years
Woman	-0.173***	-0.270***	-0.178***	-0.140***	-0.161***	-0.256***	-0.107*	-0.153***
	(0.0319)	(0.0327)	(0.0322)	(0.0323)	(0.0307)	(0.0313)	(0.0426)	(0.0400)
Other Relative 40+	0.0142	0.0432	-0.0592	-0.0602	-0.108**	0.0825	-0.0724	-0.0235
	(0.0440)	(0.0521)	(0.0464)	(0.0504)	(0.0398)	(0.0450)	(0.0545)	(0.0531)
First - Fifth	0.0204	-0.191	0.393*	0.254	0.186	0.102	0.261	0.160
	(0.162)	(0.167)	(0.171)	(0.201)	(0.239)	(0.169)	(0.265)	(0.188)
Sixth - Ninth	0.0860	-0.125	0.461**	0.302	0.311	0.184	0.387	0.206
	(0.164)	(0.169)	(0.172)	(0.203)	(0.239)	(0.171)	(0.264)	(0.194)
High School	0.289	0.0868	0.673***	0.420*	0.429	0.302	0.615*	0.410*
	(0.158)	(0.165)	(0.167)	(0.198)	(0.236)	(0.165)	(0.259)	(0.182)
Secondary Ed.	0.838***	0.705***	1.189***	0.986***	0.991***	1.006***	1.267***	1.145***
	(0.158)	(0.164)	(0.167)	(0.198)	(0.236)	(0.165)	(0.259)	(0.182)
Constant	7.976***	8.245***	7.675***	7.905***	7.922***	8.077***	7.682***	7.917***
	(0.157)	(0.162)	(0.165)	(0.197)	(0.235)	(0.163)	(0.256)	(0.179)
Observations	1200	1161	1180	1102	1377	1310	1070	926

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

7.4 Heckman Correction With Selection Restriction

7.4.1 Transportation Restriction

Tables 9 and 10 display the results of a two-step Heckman correction run on the hourly wage and hours worked in the last week regressions from Tables 7 and 8.

For each of these regressions, we observe a statistically significant inverse mills ratio, which indicates that we reject the null hypothesis of no sample selectivity bias. This has important implications for the interpretation of the results in the previous sections, as they are likely biased due to factors influencing selection into the labor force. We can thereby infer that the difference in difference regressions show a somewhat biased picture of the effects of the pandemic on women's wages and working hours, particularly for parents of the youngest age group. The negative coefficient on each of the inverse mills ratios indicates that unobserved factors that lead to an increased likelihood of selection – in this case being employed – are correlated with lower wages and fewer working hours.

We do not see evidence of sample selection bias in the weekly working hour regressions when employing a heckman selection correction for parents of older children (See Appendix B, Table 21). We do observe evidence of sample selection bias for couples without children. A similar phenomenon exists when correcting for selection bias on hourly wages: we see no evidence of selection bias for parents of children aged 13-17, but statistically significant evidence of selection bias for couples with no children (See Appendix B, Table 20).

Overall, in every case, we see that married mothers of young children are significantly less likely to work than their male counterparts. Interestingly, those who do

obtain employment may see no significant difference in their working hours in the years leading up to the pandemic, and some may actually see higher hourly wages.

Based on the results in Table 8, we see that when correcting for selection, being a woman does not have a significant effect on self-reported hours worked in the last week. This suggests that the un-corrected sample is biased in the negative direction, and that when correcting for selection issues, we no longer see a strong effect of being a woman on working hours. These results may indicate that our results for working hours for women during the pandemic may actually be larger than initially thought, or perhaps less significant.

Table 9: Self-Reported Weekly Work Hours by Year with Heckman Correction

	(1) 2017: 1-5 Years	(2) 2017: 6-12 Years	(3) 2018: 1-5 Years	(4) 2018: 6-12 Years	(5) 2019: 1-5 Years	(6) 2019: 6-12 Years
Work Hours						
Woman	16.03	4.741	-1.585	-2.544	0.0269	18.49
	(11.05)	(7.204)	(2.776)	(3.324)	(3.094)	(13.33)
First - Fifth	4.081	-3.522	-1.122	0.743	1.561	-0.808
	(5.749)	(4.552)	(2.255)	(2.403)	(2.259)	(9.253)
Sixth - Ninth	9.699	-1.312	0.264	0.0427	0.274	-0.0330
	(6.614)	(4.670)	(2.273)	(2.472)	(2.278)	(9.414)
High School	5.583	-1.289	1.209	2.196	2.204	-1.050
	(5.674)	(4.480)	(2.216)	(2.385)	(2.117)	(9.208)
Secondary Education	1.288	-5.793	-1.234	-0.928	-0.274	-7.972
	(5.434)	(5.292)	(2.313)	(2.696)	(2.102)	(10.36)
Other Relative 40+	-2.835	0.711	-1.250	-0.934	-1.532	-0.960
	(2.567)	(2.013)	(0.825)	(0.990)	(0.844)	(3.737)
Constant	49.67***	55.86***	50.67***	50.00***	49.69***	61.75***
	(5.392)	(5.756)	(2.311)	(2.838)	(2.091)	(11.55)
Working						
Woman	-1.474***	-1.210***	-1.586***	-1.203***	-1.607***	-1.114***
	(0.0552)	(0.0548)	(0.0576)	(0.0562)	(0.0554)	(0.0532)
First - Fifth	-0.243	0.281	0.112	0.130	-0.434*	0.0584
	(0.187)	(0.169)	(0.205)	(0.191)	(0.202)	(0.198)
Sixth - Ninth	-0.520**	0.275	-0.0320	0.180	-0.409*	0.0603
	(0.189)	(0.173)	(0.205)	(0.195)	(0.202)	(0.201)
High School	-0.286	0.257	0.171	0.168	-0.251	0.138
	(0.183)	(0.166)	(0.200)	(0.188)	(0.194)	(0.193)
Secondary Education	-0.0566	0.529**	0.381	0.458*	-0.103	0.409*
	(0.184)	(0.168)	(0.201)	(0.190)	(0.195)	(0.195)
Other Relative 40+	0.151*	-0.00831	0.0641	-0.0846	0.174*	0.111
	(0.0749)	(0.0853)	(0.0763)	(0.0821)	(0.0711)	(0.0817)
Transportation	0.116*	0.155**	0.244***	0.162**	0.269***	0.130*
	(0.0523)	(0.0541)	(0.0525)	(0.0565)	(0.0523)	(0.0539)
Constant	1.721***	1.060***	1.299***	1.165***	1.603***	1.090***
	(0.183)	(0.165)	(0.198)	(0.186)	(0.195)	(0.192)
/mills						
lambda	-45.49*	-33.42*	-15.17***	-16.05*	-15.07***	-61.75*
	(18.09)	(14.73)	(4.255)	(6.934)	(4.402)	(28.39)
Observations	3760	3579	3739	3448	3699	3482

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

The hourly wage regressions also show lower levels of significance for the effects of being a woman on one's wages when correcting for selection. Interestingly, those that remain significant show a positive coefficient on the binary variable for women. This may indicate that the coefficient on our previous regressions on hourly wages was also biased negatively.

These results imply that the effects of being a woman on wages and on working hours may not be as significant as regressions in the prior sections may imply, as they are indeed biased due to endogeneity issues arising from factors that influence selection into the labor force. Nevertheless, we can obtain useful information from those results, while accounting for the fact that coefficients on the binary variable for woman and perhaps on the interaction term for the effect of being a woman during the pandemic may be biased in the negative direction. As such, we must interpret the results of the weekly work hour and hourly wage regressions in Section 7.2 with some degree of caution.

Table 10: Ln Hourly Wage by Year with Heckman Correction

	(1)2017: 1-5 Years	(2)2017: 6-12 Years	(3) 2018: 1-5 Years	(4)2018: 6-12 Years	(5)2019: 1-5 Years	(6)2019: 6-12 Years
Hourly Wage						
Woman	0.588*	0.132	0.293*	0.273	0.782**	0.120
	(0.259)	(0.187)	(0.148)	(0.180)	(0.274)	(0.164)
First - Fifth	-0.0215	-0.363	0.305	0.0326	-0.131	0.00928
	(0.240)	(0.193)	(0.183)	(0.234)	(0.395)	(0.191)
Sixth - Ninth	0.148	-0.316	0.427*	0.0477	-0.0570	0.0612
	(0.242)	(0.198)	(0.182)	(0.241)	(0.398)	(0.196)
High School	0.124	-0.150	0.528**	0.0896	-0.0538	0.109
	(0.241)	(0.204)	(0.182)	(0.254)	(0.405)	(0.200)
Secondary Education	0.534*	0.333	0.948***	0.519	0.396	0.677**
	(0.258)	(0.243)	(0.192)	(0.292)	(0.418)	(0.231)
Other Relative 40+	-0.0535	0.0458	-0.0679	-0.0415	-0.166*	0.0301
	(0.0725)	(0.0594)	(0.0516)	(0.0605)	(0.0744)	(0.0576)
Constant	8.367***	8.663***	7.951***	8.445***	8.639***	8.482***
	(0.267)	(0.258)	(0.195)	(0.311)	(0.431)	(0.249)
Working						
Woman	-1.644***	-1.306***	-1.699***	-1.216***	-1.731***	-1.195***
	(0.0671)	(0.0666)	(0.0694)	(0.0686)	(0.0639)	(0.0631)
First - Fifth	0.0807	0.499*	0.248	0.434	0.461	0.317
	(0.290)	(0.252)	(0.289)	(0.301)	(0.364)	(0.280)
Sixth - Ninth	-0.141	0.553*	0.0733	0.549	0.608	0.422
	(0.291)	(0.256)	(0.289)	(0.304)	(0.364)	(0.284)
High School	0.390	0.708**	0.460	0.769**	0.843*	0.623*
	(0.282)	(0.247)	(0.281)	(0.296)	(0.358)	(0.274)
Secondary Education	0.714*	1.145***	0.798**	1.162***	1.052**	1.070***
	(0.283)	(0.249)	(0.281)	(0.298)	(0.358)	(0.275)
Other Relative 40+	0.165	0.0223	0.0354	-0.0567	0.146	0.184
	(0.0924)	(0.104)	(0.0952)	(0.0999)	(0.0845)	(0.0945)
Transportation	0.154*	0.162*	0.318***	0.178*	0.282***	0.166*
	(0.0662)	(0.0672)	(0.0655)	(0.0714)	(0.0621)	(0.0651)
Constant	0.674*	0.171	0.541	0.0912	0.210	0.183
	(0.282)	(0.246)	(0.280)	(0.291)	(0.356)	(0.272)
/mills lambda	-0.906**	-0.592*	-0.550***	-0.670*	-1.065***	-0.627*
	(0.298)	(0.270)	(0.165)	(0.282)	(0.301)	(0.264)
Observations	2169	1975	2148	1869	2444	2136

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

7.4.2 Other Relative Over 40 Restriction

In addition to the selection correction discussed in Section 7.4.1, we also introduce an exclusion restriction for whether or not there is an additional relative over forty years of age in the household. This is particularly useful for our analysis because for this variable is available for the entire sample, including during the 2020 period.

We predict that another adult relative in the household might help reduce the childcare burden on the family. Based on the theoretical model outlined in Section 4, this would likely impact a spouse's time allocations and thus their likelihood of participation in the labor force and working hours; however, it would presumably only impact wages through its impact on one's likelihood of working. Therefore, the Heckman correction with this exclusion restriction is run only on the variable for hourly wages.

Table 11 shows the results of these regressions, utilizing the difference in difference framework outlined in Section 6. These results provide evidence that our results are indeed biased due to sample selection, however, the coefficients on the exclusion restriction are only statistically significant for the youngest age group, indicating that this is not a particularly useful restriction, except for when used for parents of children in the youngest age group. Even so, we see that during June of 2020, respondents had a lower likelihood of working, but of those who remained employed, women did not experience significantly different effects than their male partners.

Table 11: Ln Hourly Wages with Heckman Correction (Other Relative Restriction)

	(1) 1-5 Years	(2) 6-12 Years	(3) 13-17 Years	(4) No Kids
Hourly Wage				
Covid	0.0943	0.00627	0.302	0.0565
	(0.0667)	(0.0717)	(0.199)	(0.0687)
Covid x Woman	0.0205	0.101	0.103	0.0172
	(0.0672)	(0.0628)	(0.159)	(0.0595)
Woman	0.220	-0.00827	0.819*	0.0179
	(0.134)	(0.132)	(0.362)	(0.117)
First - Fifth	0.141	0.00667	0.0586	0.220***
	(0.107)	(0.0973)	(0.201)	(0.0635)
Sixth - Ninth	0.242*	0.0688	0.143	0.270***
	(0.107)	(0.0996)	(0.210)	(0.0701)
High School	0.351**	0.182	0.117	0.339***
	(0.111)	(0.106)	(0.233)	(0.0880)
Secondary Ed	0.829***	0.758***	0.605*	0.967***
	(0.123)	(0.132)	(0.308)	(0.130)
Year Trends	Yes*	Yes***	Yes	Yes***
Woman Year Trends	Yes	Yes	Yes*	Yes
Constant	8.008***	8.150***	8.583***	8.159***
	(0.133)	(0.143)	(0.366)	(0.161)
Working				
Covid	-0.871***	-0.724***	-0.718***	-0.617***
	(0.0894)	(0.0877)	(0.122)	(0.0608)
Covid x Woman	0.558***	0.150	0.170	0.280***
	(0.111)	(0.111)	(0.155)	(0.0785)
Woman	-1.587***	-1.357***	-1.296***	-1.060***
	(0.100)	(0.0999)	(0.140)	(0.0699)
First - Fifth	0.200	0.307*	0.176	0.169*
	(0.154)	(0.137)	(0.170)	(0.0701)
Sixth - Ninth	0.175	0.352*	0.259	0.283***
	(0.154)	(0.139)	(0.174)	(0.0730)
High School	0.503***	0.587***	0.521**	0.603***
	(0.150)	(0.134)	(0.168)	(0.0694)
Secondary Ed	0.882***	1.044***	0.964***	1.121***
	(0.150)	(0.134)	(0.168)	(0.0696)
Other Relative 40+	0.0884*	0.0680	-0.0372	-0.0234
	(0.0429)	(0.0466)	(0.0651)	(0.0298)
Year Trends	Yes	Yes	Yes	Yes
Woman Year Trends	Yes	Yes	Yes	Yes
Constant	0.605***	0.443**	0.269	-0.0604
	(0.168)	(0.153)	(0.196)	(0.0863)
/mills				
lambda	-0.498***	-0.336	-1.188**	-0.440**
	(0.148)	(0.173)	(0.441)	(0.164)
Observations	9424	8328	4227	16625

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table. Overall yearly trends and those for women are adjusted such that 2017 = 1, 2018 = 2, 2019 = 3, and 2020 = 4.

8 Conclusion

Through this thesis, we investigate the disparate effects of the COVID-19-induced recession on men and women. We utilize a model of household utility maximization to predict that school and daycare closures will impact household labor market decisions for families with younger children.

Using a difference in difference model, and a Heckman correction to better understand the effects of endogeneity related to sample selection on our model, we find that among parents who remain in the labor force, mothers of young children have smaller reductions in their work hours relative to their husbands during the pandemic, and do not see significant changes in their wages as a result of the pandemic when compared to their male counterparts. However, mothers, who are already up to 36% less likely to be in the labor force, are as much as 6% more likely than their male counterparts to exit the labor force during the pandemic, even when controlling for pre-existing trends for women's labor force participation over time. This is most probably to compensate for the drastic increase in childcare needs during the pandemic.

These findings have concerning implications for the future of gender equality in the workforce and expectations for women in household production roles. Moving forward, it will be important for governments in Colombia and other similar countries to target economic recovery policies at bringing women back into the workforce. If not, many of the improvements in gender equality seen over the past several decades may all be reversed.

This thesis has a number of limitations. Namely, finding a selection restriction that is valid both before and during the pandemic proved to be quite difficult. We did not find the presence of another relative in the household to be a valid exclusion restriction for any group other than the parents of the youngest children. As such, we were only able to find a valid exclusion restriction to correct for selection biases in the years prior to the pandemic. We observe bias due to endogeneity issues related to sample selection in the years leading up to the pandemic, and therefore must interpret the difference in difference results regarding hours worked and wages with some degree of caution. Future research ought to take advantage of data that becomes

available on access to transportation – or other valid exclusion restrictions – in order to fully understand the impact of the pandemic on gender inequality in Colombia. The restriction in and of itself has limitations as well: in particular, it is likely that access to transportation is linked to wages, as higher wages would allow increased access to personal transportation.

Further, the nature of the GEIH data limits the sorts of control variables we are able to include. A more robust analysis could include controls for work experience, and panel data would allow a better understanding of the effects on individual respondents over time, rather than different groups in each year.

Future research on this topic ought to focus on what sorts of policies might be most effective in mitigating the effects of the pandemic on mothers. This is of the utmost importance, as effective policy will be essential in ensuring that these harmful effects don't persist.

Appendices

A Summary Statistics Appendix

Table 12: Summary Statistics 2017

	Count	Mean	Standard Deviation	Min	Max
Age	60710	32.82573	21.70309	0	108
Woman	60710	.528595	.4991858	0	1
Working	36966	.6824109	.465545	0	1
Hours Worked Last Week	27377	41.90664	15.35224	1	80
Labor Force Participation	37379	.7646004	.424254	0	1
Hourly Wage (ln)	11357	8.29248	.6511669	4.374059	11.95476
Other Relative 40+	27489	.1559169	.3627832	0	1
Married Couple	27489	.6929681	.4612711	0	1
Has Kids	27489	.4494161	.4974437	0	1
Youngest Kid 1-5	11237	.3939664	.4886493	0	1
Youngest Kid 6-12	11237	.3935214	.4885525	0	1
Youngest Kid 13-17	11237	.2125122	.4091035	0	1
No Education	57965	.0575175	.2328307	0	1
Preschool Education	57965	.0322091	.1765565	0	1
1st - 5th Grade Education	57965	.2700078	.4439673	0	1
6th - 9th Grade Education	57965	.1901837	.3924494	0	1
High School Education	57965	.2178556	.4127923	0	1
Secondary Education	57965	.2322263	.4222563	0	1
N	60710				

Notes: The above table displays summary statistics for the cleaned, unrestricted sample of 2017 respondents.

Table 13: Summary Statistics 2018

	Count	Mean	Standard Deviation	Min	Max
Age	60299	33.57525	21.81335	0	105
Woman	60299	.5273885	.4992534	0	1
Working	37234	.6759682	.4680182	0	1
Hours Worked Last Week	27141	42.39612	14.44095	1	80
Labor Force Participation	37726	.7542809	.4305185	0	1
Hourly Wage (ln)	11080	8.381305	.6630064	4.017283	11.82123
Other Relative 40+	27661	.1552728	.3621711	0	1
Married Couple	27661	.6905752	.4622649	0	1
Has Kids	27661	.4341492	.4956537	0	1
Youngest Kid 1-5	11053	.3953678	.4889517	0	1
Youngest Kid 6-12	11053	.3827015	.4860684	0	1
Youngest Kid 13-17	11053	.2219307	.4155636	0	1
No Education	57735	.0517191	.2214612	0	1
Preschool Education	57735	.0314714	.1745894	0	1
1st - 5th Grade Education	57735	.2650385	.4413575	0	1
6th - 9th Grade Education	57735	.1816056	.3855225	0	1
High School Education	57735	.2272798	.4190784	0	1
Secondary Education	57735	.2428856	.4288302	0	1
N	60299				

Notes: The above table displays summary statistics for the cleaned, unrestricted sample of 2018 respondents.

Table 14: Summary Statistics 2019

	Count	Mean	Standard Deviation	Min	Max
Age	60136	33.64086	21.86098	0	103
Woman	60136	.5285852	.4991864	0	1
Working	36936	.6571637	.4746637	0	1
Hours Worked Last Week	26190	42.24803	14.93226	1	80
Labor Force Participation	37414	.7448816	.4359336	0	1
Hourly Wage (ln)	12314	8.436289	.6717042	4.710531	11.84143
Other Relative 40+	27663	.1572498	.3640427	0	1
Married Couple	27663	.6843799	.4647708	0	1
Has Kids	27663	.4290569	.4949504	0	1
Youngest Kid 1-5	10904	.4001284	.4899466	0	1
Youngest Kid 6-12	10904	.3943507	.4887332	0	1
Youngest Kid 13-17	10904	.2055209	.4041003	0	1
No Education	57655	.0540283	.2260754	0	1
Preschool Education	57655	.0302315	.1712253	0	1
1st - 5th Grade Education	57655	.257185	.437086	0	1
6th - 9th Grade Education	57655	.1815281	.3854584	0	1
High School Education	57655	.2316365	.4218816	0	1
Secondary Education	57655	.2453907	.4303223	0	1
N	60136				

Notes: The above table displays summary statistics for the cleaned, unrestricted sample of 2019 respondents.

Table 15: Summary Statistics 2020

	Count	Mean	Standard Deviation	Min	Max
Age	61918	34.18906	22.07713	0	110
Woman	61918	.5367421	.4986522	0	1
Working	38021	.4888877	.4998831	0	1
Hours Worked Last Week	19715	37.22399	15.44265	1	80
Labor Force Participation	38523	.6610856	.4733469	0	1
Hourly Wage (ln)	9062	8.517217	.7443908	4.086376	12.22442
Other Relative 40+	28360	.1689704	.3747324	0	1
Couple	28360	.6977786	.4592288	0	1
Has Kids	28360	.4255642	.494437	0	1
Youngest Kid 1-5	11109	.3944549	.4887553	0	1
Youngest Kid 6-12	11109	.3825727	.4860371	0	1
Youngest Kid 13-17	11109	.2229724	.4162587	0	1
No Education	59482	.0548569	.2277027	0	1
Preschool Education	59482	.0243267	.1540626	0	1
1st - 5th Grade Education	59482	.2536902	.435126	0	1
6th - 9th Grade Education	59482	.173935	.3790567	0	1
High School Education	59482	.2457382	.4305276	0	1
Secondary Education	59482	.247453	.4315358	0	1
N	61918				

Notes: The above table displays summary statistics for the cleaned, unrestricted sample of 2020 respondents.

B Regressions Appendix

Table 16: Difference in Difference (Older/No Children)

	(1)Weekly Work 12-17 Years	(2)Weekly Work No Kids	(3) LFP 12-17 Years	(4) LFP No Kids	(5) Ln Hrly Wage 12-17 Years	(6)Ln Hrly Wag No Kids
Covid	-8.050***	-6.446***	-0.0905***	-0.0754***	-0.0968	-0.113***
	(0.828)	(0.437)	(0.0196)	(0.0113)	(0.0550)	(0.0292)
Covid x Woman	4.825***	4.388***	-0.0147	-0.00700	0.00193	0.106**
	(0.986)	(0.535)	(0.0204)	(0.0116)	(0.0629)	(0.0343)
Woman	-10.13***	-9.365***	-0.281***	-0.342***	-0.193***	-0.233***
	(0.453)	(0.242)	(0.0104)	(0.00598)	(0.0308)	(0.0166)
Other Rel. 40+	0.664	0.346	-0.0123	-0.00559	-0.147***	-0.0604**
	(0.625)	(0.292)	(0.0142)	(0.00711)	(0.0419)	(0.0203)
First - Fifth	0.574	2.514***	-0.000468	-0.00648	0.155	0.290***
	(1.270)	(0.500)	(0.0303)	(0.0139)	(0.126)	(0.0524)
Sixth - Ninth	2.642*	3.622***	0.0265	0.0236	0.299*	0.376***
	(1.317)	(0.547)	(0.0312)	(0.0147)	(0.128)	(0.0545)
High School	2.891*	5.718***	0.0450	0.0584***	0.462***	0.556***
	(1.251)	(0.508)	(0.0299)	(0.0139)	(0.124)	(0.0515)
Secondary Ed.	2.208	4.732***	0.139***	0.178***	1.234***	1.330***
	(1.258)	(0.506)	(0.0301)	(0.0140)	(0.124)	(0.0512)
Year Trends	Yes	Yes	Yes	Yes*	Yes*	Yes***
Constant	-558.8	18.29	-13.24	18.74*	-86.34*	-120.2***
	(554.7)	(291.4)	(13.10)	(7.403)	(37.79)	(19.85)
Observations	5109	19333	7181	27587	2118	6919

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

Table 17: Difference in Difference

	(1)Wkly Work 12-17 Years	(2)Wkly Work No Kids	(3) LFP 12-17 Years	(4) LFP No Kids	(5) Ln Hrly Wage 12-17 Years	(6)Ln Hrly Wag No Kids
Covid	-7.661***	-6.236***	-0.0704**	-0.0901***	-0.147*	-0.0970**
	(0.947)	(0.493)	(0.0237)	(0.0138)	(0.0631)	(0.0333)
Covid x Woman	3.873**	3.840***	-0.0542	0.0202	0.120	0.0670
	(1.494)	(0.800)	(0.0332)	(0.0187)	(0.0965)	(0.0522)
Woman	-11.08***	-9.908***	-0.320***	-0.314***	-0.0671	-0.273***
	(1.204)	(0.638)	(0.0278)	(0.0159)	(0.0838)	(0.0440)
Other Relative 40+	0.657	0.347	-0.0123	-0.00561	-0.147***	-0.0603**
	(0.625)	(0.292)	(0.0142)	(0.00711)	(0.0418)	(0.0203)
First - Fifth	0.596	2.511***	0.0000499	-0.00627	0.153	0.289***
	(1.270)	(0.500)	(0.0303)	(0.0139)	(0.126)	(0.0524)
Sixth - Ninth	2.662*	3.618***	0.0270	0.0238	0.296*	0.374***
	(1.318)	(0.547)	(0.0312)	(0.0147)	(0.128)	(0.0545)
High School	2.906*	5.715***	0.0453	0.0585***	0.459***	0.554***
	(1.251)	(0.508)	(0.0299)	(0.0139)	(0.124)	(0.0515)
Secondary Ed	2.224	4.728***	0.139***	0.179***	1.232***	1.329***
	(1.258)	(0.506)	(0.0301)	(0.0140)	(0.124)	(0.0512)
Year Trends	Yes	Yes	Yes	Yes	Yes**	Yes***
Woman Yr Trends	Yes	Yes	Yes	Yes	Yes	Yes
Constant	45.31***	41.71***	0.902***	0.835***	7.797***	7.739***
	(1.382)	(0.602)	(0.0341)	(0.0174)	(0.131)	(0.0575)
Observations	5109	19333	7181	27587	2118	6919

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

Overall yearly trends and those for women are adjusted such that 2017 = 1, 2018 = 2, 2019 = 3, and 2020 = 4.

Table 18: Self-Reported Weekly Work Hours by Year (Older/No Children

	(1) 2017: 13-17 Years	(2) 2017: No Kids	(3) 2018: 13-17 Years	(4) 2018: No Kids	(5) 2019: 13-17 Years	(6) 2019: No Kids	(7) 2020: 13-17 Years	(8) 2020: No Kids
Woman	-10.54***	-9.682***	-10.11***	-9.121***	-9.516***	-8.999***	-5.902***	-5.550***
	(0.794)	(0.424)	(0.715)	(0.401)	(0.797)	(0.426)	(0.963)	(0.493)
Other Relative 40+	0.561	0.921	0.737	0.947	0.639	-0.296	0.895	-0.470
	(1.209)	(0.564)	(1.116)	(0.547)	(1.260)	(0.580)	(1.458)	(0.653)
First - Fifth	0.558	3.544***	1.821	2.157*	1.919	2.639**	-1.730	1.197
	(2.221)	(0.961)	(2.209)	(0.920)	(3.069)	(0.937)	(2.999)	(1.255)
Sixth - Ninth	0.893	5.027***	4.241	3.770***	6.650*	4.292***	-1.199	0.275
	(2.318)	(1.050)	(2.291)	(1.009)	(3.156)	(1.032)	(3.108)	(1.360)
High School	2.438	7.637***	4.662*	5.049***	5.102	5.815***	-0.364	3.968**
	(2.180)	(0.989)	(2.185)	(0.934)	(3.048)	(0.949)	(2.913)	(1.258)
Secondary Ed.	1.174	5.253***	2.960	3.144***	2.284	3.148***	3.163	7.366***
	(2.204)	(0.984)	(2.198)	(0.932)	(3.051)	(0.951)	(2.930)	(1.246)
Constant	46.18***	40.37***	44.09***	42.16***	44.13***	41.68***	39.99***	35.79***
	(2.086)	(0.908)	(2.105)	(0.863)	(2.982)	(0.872)	(2.813)	(1.184)
Observations	1324	5125	1428	5174	1276	5058	1081	3976

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

Table 19: Hourly Wages by Year (Older/No Kids)

	(1) 2017: 13-17 Years	(2) 2017: No Kids	(3) 2018: 13-17 Years	(4) 2018: No Kids	(5) 2019: 13-17 Years	(6) 2019: No Kids	(7) 2020: 13-17 Years	(8) 2020: No Kids
Woman	-0.144**	-0.234***	-0.150**	-0.229***	-0.267***	-0.227***	-0.227***	-0.138***
	(0.0493)	(0.0272)	(0.0537)	(0.0294)	(0.0496)	(0.0284)	(0.0636)	(0.0328)
Other Relative 40+	-0.196*	-0.0700	-0.186*	-0.0467	-0.110	-0.0862*	-0.106	-0.0425
	(0.0777)	(0.0373)	(0.0848)	(0.0427)	(0.0766)	(0.0392)	(0.0949)	(0.0433)
First - Fifth	0.242	0.256*	0.247	0.294*	0.152	0.238**	-0.332	0.414***
	(0.188)	(0.0998)	(0.243)	(0.115)	(0.228)	(0.0902)	(0.489)	(0.121)
Sixth - Ninth	0.395*	0.416***	0.361	0.394***	0.282	0.291**	-0.0569	0.382**
	(0.190)	(0.103)	(0.247)	(0.118)	(0.239)	(0.0944)	(0.490)	(0.130)
High School	0.518**	0.617***	0.552*	0.548***	0.357	0.457***	0.212	0.635***
	(0.182)	(0.0989)	(0.238)	(0.113)	(0.226)	(0.0885)	(0.483)	(0.117)
Secondary Ed.	1.152***	1.219***	1.357***	1.344***	1.170***	1.314***	1.030*	1.458***
	(0.182)	(0.0983)	(0.238)	(0.113)	(0.225)	(0.0880)	(0.484)	(0.117)
Constant	7.854***	7.799***	7.841***	7.861***	8.070***	7.957***	8.211***	7.761***
	(0.178)	(0.0968)	(0.233)	(0.111)	(0.222)	(0.0850)	(0.480)	(0.114)
Observations	487	1709	552	1706	576	1910	503	1594

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: No education serves as the reference category and is excluded from the table.

Table 20: Self-Reported Weekly Work Hours by Year with Heckman Correction (Older/No Children)

	(1)2017: 13-17 Years	(2)2017: No Kids	(3) 2018: 13-17 Years	(4)2018: No Kids	(5)2019: 13-17 Years	(6)2019: No Kids
Hourly Wage						
Woman	0.791	0.287	1.063	0.692*	0.346	0.516*
	(0.910)	(0.186)	(0.815)	(0.342)	(0.336)	(0.246)
First - Fifth	0.250	0.0211	-0.0656	0.119	0.0144	0.168
	(0.404)	(0.158)	(0.652)	(0.235)	(0.383)	(0.147)
Sixth - Ninth	0.195	0.178	0.101	-0.0167	0.303	0.0693
	(0.457)	(0.165)	(0.653)	(0.267)	(0.390)	(0.162)
High School	0.247	0.198	-0.192	-0.120	0.0855	0.0456
	(0.477)	(0.199)	(0.781)	(0.316)	(0.399)	(0.185)
Secondary Education	0.672	0.599*	0.278	0.316	0.590	0.592*
	(0.621)	(0.261)	(0.944)	(0.412)	(0.482)	(0.259)
Other Relative 40+	-0.201	-0.0668	-0.178	0.000531	-0.0929	-0.0994
	(0.174)	(0.0478)	(0.234)	(0.0924)	(0.134)	(0.0641)
Constant	8.648***	8.590***	9.265***	9.285***	8.813***	8.915***
	(0.866)	(0.312)	(1.102)	(0.543)	(0.542)	(0.321)
Working						
Woman	-1.170***	-1.089***	-1.138***	-0.980***	-0.976***	-1.094***
	(0.0922)	(0.0465)	(0.0892)	(0.0450)	(0.0895)	(0.0441)
First - Fifth	0.0137	0.473***	0.296	0.107	0.209	0.0801
	(0.305)	(0.139)	(0.328)	(0.151)	(0.347)	(0.128)
Sixth - Ninth	0.280	0.512***	0.225	0.331*	-0.0525	0.259
	(0.310)	(0.144)	(0.334)	(0.155)	(0.360)	(0.134)
High School	0.363	0.804***	0.673*	0.595***	0.384	0.517***
	(0.298)	(0.138)	(0.323)	(0.150)	(0.344)	(0.127)
Secondary Education	0.644*	1.251***	1.010**	0.962***	0.860*	0.984***
	(0.301)	(0.139)	(0.327)	(0.151)	(0.347)	(0.128)
Other Relative 40+	0.00883	-0.00817	-0.0158	-0.0816	-0.0203	0.0193
	(0.140)	(0.0627)	(0.138)	(0.0621)	(0.136)	(0.0611)
Transportation	0.0393	0.118*	0.0911	0.114*	0.192*	0.0940*
	(0.0950)	(0.0467)	(0.0947)	(0.0463)	(0.0939)	(0.0450)
Constant	0.400	-0.305*	0.132	-0.159	0.231	-0.00221
	(0.297)	(0.137)	(0.318)	(0.148)	(0.337)	(0.125)
/mills lambda	-1.392	-0.792**	-1.963	-1.489**	-1.161	-1.138**
	(1.338)	(0.273)	(1.272)	(0.547)	(0.619)	(0.362)
Observations	930	3666	1023	3859	981	4062

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Heckman correction for couples without children and parents of older children.

No education serves as the reference category and is excluded from the table.

Table 21: Self-Reported Weekly Work Hours by Year with Heckman Correction (Older/No Children)

	(1)2017: 13-17 Years	(2)2017: No Kids	(3) 2018: 13-17 Years	(4)2018: No Kids	(5)2019: 13-17 Years	(6)2019: No Kids
Work Hours						
Woman	30.32	14.22	12.44	24.64	1.849	17.89
	(48.84)	(9.732)	(18.45)	(14.71)	(8.254)	(10.56)
First - Fifth	-0.998	-1.675	-1.749	5.941	0.353	4.933
	(13.07)	(3.942)	(8.122)	(5.504)	(6.229)	(3.842)
Sixth - Ninth	-2.060	1.359	3.301	5.747	5.662	4.876
	(13.61)	(3.838)	(8.177)	(5.645)	(6.337)	(3.967)
High School	-1.827	0.898	-0.532	2.027	2.673	2.642
	(13.16)	(4.188)	(8.488)	(5.388)	(6.394)	(3.859)
Secondary Education	-9.648	-7.850	-6.664	-7.861	-2.999	-6.504
	(16.99)	(6.183)	(10.55)	(7.000)	(7.409)	(5.247)
Other Relative 40+	0.0484	-0.663	0.744	1.145	0.861	-0.786
	(6.775)	(1.818)	(3.800)	(2.578)	(2.408)	(2.013)
Constant	66.78**	60.33***	57.86***	64.29***	52.96***	59.48***
	(25.49)	(8.169)	(12.61)	(10.18)	(8.760)	(7.165)
Working						
Woman	-1.116***	-1.055***	-1.122***	-1.021***	-0.936***	-1.071***
	(0.0733)	(0.0361)	(0.0715)	(0.0350)	(0.0737)	(0.0352)
First - Fifth	-0.00142	0.209*	0.120	-0.106	0.0826	-0.101
	(0.211)	(0.0843)	(0.221)	(0.0959)	(0.269)	(0.0871)
Sixth - Ninth	0.0374	0.136	-0.0103	-0.0629	0.0614	-0.0208
	(0.218)	(0.0894)	(0.227)	(0.101)	(0.276)	(0.0929)
High School	0.0715	0.248**	0.211	0.0598	0.173	0.104
	(0.208)	(0.0854)	(0.220)	(0.0966)	(0.268)	(0.0878)
Secondary Education	0.262	0.560***	0.449*	0.322***	0.423	0.384***
	(0.212)	(0.0870)	(0.223)	(0.0980)	(0.272)	(0.0895)
Other Relative 40+	0.0111	0.0461	0.0161	-0.0143	-0.0106	0.0107
	(0.109)	(0.0473)	(0.109)	(0.0469)	(0.113)	(0.0483)
Transportation	0.0457	0.0682	0.0415	0.0566	0.134	0.0629
	(0.0740)	(0.0357)	(0.0729)	(0.0354)	(0.0763)	(0.0354)
Constant	1.204***	0.783***	1.108***	0.947***	0.947***	0.920***
	(0.206)	(0.0834)	(0.218)	(0.0947)	(0.263)	(0.0859)
/mills lambda	-84.92	-47.17*	-47.46	-67.78*	-28.61	-51.89**
	(100.7)	(18.90)	(38.12)	(28.66)	(19.95)	(19.49)
Observations	1752	6427	1873	6612	1658	6561

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Heckman correction for couples without children and parents of older children.

No education serves as the reference category and is excluded from the table.

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